

REMARKS/ARGUMENT

Regarding the Claims in General:

Claims 1-66 are now pending. Claims 1-7, 14-33, 37-39, 43-46, 50-52, 56-59, and 61 are withdrawn from consideration as drawn to non-elected species. As it is applicant's position that generic claims are allowable, it is respectfully requested that the withdrawn claims be examined and allowed.

In a communication pursuant to 37 C.F.R. 1.116 dated April 14, 2004, claims 8, 34, 35 and 48 were amended to improve the form thereof by eliminating redundant recitations and clarifying potentially ambiguous recitations, etc. Withdrawn claim 33 was also similarly amended. These claims were not narrowed by the amendments, and remain generic.

Also, new claims 62-66 were added to provide applicant with additional protection to which he appears to be entitled in light of the known prior art. Claims 62 and 63 are directed to the elected species. Claims 64-66 are generic.

The amendments to claims 8, 34, 35, and 48, and new claims 62-66 have been carried forward herein.

Regarding The Allowable Subject Matter

Applicants note with appreciation the indication that claims 11 and 12 would be allowed if rewritten in independent form incorporating the limitations of their respective parent claims. Because these claims are all indirectly dependent on claim 8 which are believed to be allowable as amended, claims 11 and 12 have been retained in dependent form pending the Examiner's further consideration.

Regarding The Prior Art Rejections

In the final rejection, claims 8, 9, and 13, 35, 36, 41, 42, 47-49, 54, 55, and 60 were rejected as unpatentable over Walrath et al. U.S. Patent 6,109,293 (Walrath) in view of Tyler U.S. Patent 4,840,312 (Tyler), Claim 34 was been rejected as unpatentable over Hrubby U.S. Patent 3,323,725 (Hrubby) in view of Cochran U.S. Patent 4,681,260 (Cochran), and claims 10, 40 and 53 were rejected

as unpatentable over Walrath in view of Tyler, and further in view of Lemkin U.S. Patent 4,538,762 (Lemkin).

Reconsideration and withdrawal of these rejections are respectfully requested.

Preliminarily, the Examiner's attention is respectfully directed to the accompanying declaration of one of the inventors, Carl L.C. Kah, Jr. pursuant to 37 C.F.R. 1.32 (Kah Decl.). The discussion below is based on and supported by the facts and opinions stated in Mr. Kah's declaration, which should be given full credence in view of his demonstrated experience and skill in this art.

The Rejections of 8-10, 13, 35, 36, 40-42, 47-49, 53-55, and 60 Over Walrath in view of Tyler or Walrath in View of Tyler, and Further in View of Lemkin

The Examiner says that it would have been obvious to one skilled in the art to have modified Walrath by putting a removable nozzle as taught by Tyler on Walrath's outlet 30 to use Walrath's device in a sprinkler system. With all due respect, careful consideration of the Kah Declaration and the comments below will reveal that this rejection is not valid.

For one thing, claim 8 is directed to a sprinkler assembly, not a device for "use in a sprinkler system" as asserted by the Examiner. The device disclosed by Walrath is not a sprinkler or a sprinkler assembly, but a valve, and even though the patent suggests use of the subject valve in a sprinkling system (see col. 2, lines 53-65), a person skilled in the art would recognize that this suggestion is related only to controlling the flow of water through the system piping. It would not be regarded as a suggestion to use the valve as, or in, a sprinkler *per se*.

Indeed, the only reference to outlet 30 is at col. 9, lines 64-66, which refers to "typical hose connections, hose bibs, and so forth as would be commonly known to those in the industry." This is what one skilled in the art would understand that Walrath intends, and is referring to. Contrary to the assertion of the Examiner in the final rejection, and in the advisory action mailed April 21, 2004, there is nothing in the reference which suggests putting a nozzle on outlet 30, or using the device itself *as a sprinkler*. (See Kah Decl., ¶¶10, 11.)

Nor does Tyler remedy the deficiencies in Walrath. There is nothing in Tyler which would motivate one skilled in the art to put a nozzle on the outlet of Walrath's valve. Tyler's sprinkler

doesn't even have a flow control valve, and nothing in Tyler suggests any reason for there to be one. Claim 8 is accordingly patentable over the combined teachings of Walrath and Tyler. (See Kah Decl., ¶12.)

Most importantly, as explained in the Kah Declaration (see ¶¶13-19), a person having ordinary skill in the art would understand that Walrath's venturi device would be totally unsuitable for use as a flow control valve in a sprinkler head, (a) because a sprinkler head incorporating Walrath's valve would be unacceptably long, and (b) in the case of a gear drive sprinkler, the diameter of a drive shaft of a sprinkler head using Walrath's valve would be too large.

The Walrath patent claims to provide flow control with increased flow rates and lower pressure drop. Referring to Fig. 2 of the patent drawings, this is accomplished because the effects of the constriction region on the upstream side (8) of interface (14) are compensated for by the expansion region on the downstream side 18 of interface (14). According to Bernoulli's principle, on the upstream side, there is a pressure loss due to the increase in flow velocity in the constricted portion. On the downstream side, as the fluid expands, and the velocity is reduced, there is recovery of the pressure loss. However, the expansion must be gradual. As those familiar with venturi devices know, and in fact, as stated in Walrath (see col. 9, lines 44-49; col. 13, lines 24-35), the angle on the expansion side must be 7 degrees or less to avoid flow separation and/or cavitation, with consequent reduced pressure recovery (Kah Decl., ¶14).

The problem addressed by this invention is to provide a shut-off valve in a sprinkler head which permits changing nozzles to achieve different flow rates without having to shut down the entire sprinkler system. If a person skilled in the art were to consider using Walrath's device as a shut-off valve in such an application, he or she would immediately recognize that the profile and dimensions of a venturi would have to be selected to take account of the expected flow rates of the nozzles. In a typical sprinkler layout, there would be nozzles having flow rates ranging from about 1 gallon per minute to 12 gallons per minute, or even higher, e.g., 25 to 50 gallons per minute in some larger sprinklers with changeable nozzles, and even up to 100 gallons per minute for golf heads. If the venturi throat were not sized to accommodate the higher flow rates, it would be choked, i.e., the pressure required to accelerate the flow to a velocity sufficient for the required flow to pass through the venturi throat would be higher than the available water pressure at the sprinkler inlet

(Kah Decl., ¶15).

For example, to accommodate a flow rate 12 gallons per minute with typical available pressures, it would be necessary to provide a minimum throat diameter of about 0.3 inch. Because of the split venturi design, the internal valve diameter 24 on the downstream side must inherently be twice the maximum open size of the throat (plus an additional amount for overlap) to prevent leakage in the closed position. Therefore, diameter 24 would have to be between about 0.7 to 0.8 inch. As pointed out at col. 9, lines 35-44 of Walrath, the length to diameter ratio on the downstream side should be 6:1, and preferably 8:1. Otherwise, the pressure loss from the constriction region could never be fully recovered.

Thus, according to Walrath, for the required diameter, the length should be at least about 2 inches on the downstream side, plus the upstream length of the convergence side of the valve and its required seal. Higher flow rates would require a larger throat size, and correspondingly, a larger downstream-side diameter, so the valve would have to be even longer to achieve reasonable pressure recovery. Those skilled in the art would understand of the need to avoid valve designs which result in pressure loss as this can cause reduction of throw distance from the nozzle or other degradation of the spray pattern. Clark U.S. Patent 6,241,158, in the introductory section, and starting at col. 2, line 34, discusses this in some detail (Kah Decl., ¶16).

A person skilled in the art would recognize that a venturi valve designed to accommodate a reasonable range of flow rates would not fit in conventional sprinkler head. For a gear drive sprinkler of the type shown in this patent disclosure, and even up to 12 GPM flow, the nozzle drive shaft could be as small as ½ inch in diameter and ½ to ¾ inches long. Use of Walrath's type of valve would be rejected due to the disadvantages of having to increase the length of the sprinkler head. Not only would a longer head require costly redesign, but it would also be more costly to manufacture. It would also require that the system be buried more deeply in the ground, making installation more costly and inconvenient (Kah Decl., ¶17).

Moreover, those skilled in the art know that for gear driven sprinklers, it is desirable for the nozzle drive shaft have as small a diameter as possible. Increasing the diameter puts a larger load on the thrust bearing. Conventional sprinkler heads have drive shaft diameters in the range of 0.4 to 0.5 inch. Since the water must flow through the drive shaft, if Walrath's valve were used in a sprinkler head, internal diameter 24 would determine the minimum drive shaft diameter.

A person skilled in the art would recognize that a drive shaft diameter of between about 0.7 to 0.8 inch as suggested in paragraph 16 above would not be as desirable as a smaller diameter shaft such as allowed by the valve types disclosed in this patent application. The bearing structure for the drive shaft would have to be larger and have more rotational friction to accommodate the larger load, and apart from design and tooling costs, the materials cost would increase. A person skilled in the art would try to avoid redesign cost size increases, and manufacturing and material cost increases, and would therefore not be motivated to employ Walrath's venturi valve in a gear drive sprinkler (Kah Decl., ¶19).

Even if one were to combine the features of Walrath and Tyler, despite the compelling reasons not to do so discussed above, the result would not meet the terms of most of the claims. For example, claim 9 recites that:

. . . the sleeve valve is rotatable at least between a fully opened position in which the flow opening is aligned with the flow path to allow unobstructed flow through the nozzle housing. . .

This is not the case in Walrath. Even when the valve is open, sloping portions 36 and 40 obstruct flow path 12, despite the Examiner's assertion to the contrary in the advisory action. In fact, a person skilled in the art would immediately recognize that Walrath's valve depends for its operation on such an obstruction (Kah Decl., ¶20).

Claim 10 is dependent on claim 9, and is patentable for the reasons stated above. Lemkin does not remedy the deficiencies in the combined teachings of Walrath and Tyler. Moreover, claim 10 calls for an indicator for the open and closed condition of the valve. As the Examiner recognizes, Lemkin's indicator is for selecting spray patterns. It has no relationship to the open or closed condition of a valve.

Claim 13 calls for a conical shaped sleeve valve. As explained the Kah Declaration (see ¶21), it would not be obvious to a person skilled in the art to make Walrath's valve conical. Indeed, since the operation of Walrath's venturi-type valve depends on the convergence and subsequent divergence of the flow path, making the valve conical would render it inoperative.

This alone negates a finding of obviousness, *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). See, also, M.P.E.P. (8th Ed., Rev. 1, Feb. 2003) §2143.01.

Claim 35 also recites several features which would not be found in a combination of the teachings of Walrath and Tyler. For example, claim 35 recites a nozzle housing and a nozzle removably mounted in an outlet passage of the nozzle housing. As explained in the Kah Declaration

(see ¶22), a person having ordinary skill in the art would find no part in Walrath which can be called a nozzle housing having an outlet passage in which a nozzle is removably mounted. The Examiner appears to have recognized this deficiency by his suggestion to attach a nozzle to valve outlet 30. A nozzle so attached would not be mounted *in a housing*, as called for by claim 35.

Claim 35 further requires that the nozzle housing (with the nozzle removably mounted in the outlet passage thereof) have a flow path therein, with:

. . . a main portion extending along the central axis of the nozzle housing and an angled portion defining . . . [the] outlet passage . . .
and a valve disposed in the nozzle housing flow path which is substantially coaxial with the nozzle housing flow path . . .

Walrath does not have anything corresponding to a nozzle housing. Nor is the flow path in Walrath's valve substantially coaxial with a nozzle housing central axis. Figs. 2 and 3 of the patent clearly show that the flow path in Walrath is off the central axis at the interface 14. In fact, modifying the Walrath valve to meet this limitation of claim 35 would make the Walrath device inoperative (Kah Decl., ¶¶23-24).

Finally, claim 35 requires that the valve be:

so constructed and configured that the parts thereof which control the water flow when the valve is not in the open position are substantially completely displaced from the flow path when the valve is in a fully open position.

Whether interface 14 or angled portion 26 (or both) are considered to be the parts which control the water flow when the valve is not in the open position, a person having ordinary skill in the art would not consider either of these parts to be substantially completely displaced from the flow path when the valve is in a fully open position (Kah Decl., ¶26).

Claim 48 also recites features which would not be found in any reasonable combination of the teachings of Walrath and Tyler. In particular, claim 48 requires a nozzle removably mounted *in the outlet passage*, which is not present in Walrath, as explained above. Claim 48 also recites:

a valve disposed in the nozzle housing which is operable between open and closed positions to control water flow between the main and angled portions of the nozzle housing flow path. . .

In Walrath, the angled portion of the flow path includes elbow portion 26. Even if this is read as a “nozzle housing flow path”, in the closed position, water is not excluded from elbow 26. Nothing in Tyler remedies this deficiency (Kah Decl., ¶27-28).

Finally, claim 48 requires that the valve be:

so constructed and configured that the parts thereof which control the water flow cause substantially no obstruction or turbulence in the nozzle flow path when the valve is in a fully open position.

In the discussion of claim 35 above, it was demonstrated that both interface 14 and sloping portion 26 cause obstruction and turbulence. The valve relies on the downstream divergent portion to eliminate the turbulence (Kah Decl., ¶29).

Claims 40 and 53, are patentable over the combination of Walrath and Tyler for the reasons stated above in connection with claim 10. Lemkin does not remedy the deficiencies in the other references, and does not provide the motivation to combine the references lacking from the references themselves.

The Rejection of Claim 34 Over Hruby in View of Cochran.

From the Examiner’s listing of the elements of Hruby (stationary housing assembly 91, nozzle housing assembly 103, 93, etc.) in Section 5 of the Office Action, it is assumed the Examiner is relying on the embodiment shown in Figs. 8-10 of the patent.

Claim 34 is directed to the combination of a sprinkler with a stationary housing, a rotatably driven head, and a shut off valve rotatably operable around a longitudinal axis. Hruby’s nozzle housing is threadedly attached in a fixed position on housing assembly 91. No person skilled in any mechanical arts would consider it reasonable to describe this as mounted for rotation, as asserted by the Examiner. (See Kah Decl., ¶32)

Despite the Examiner’s strained interpretation of the phrase “mounted for rotation”, he nevertheless appears to recognize that Hruby does not teach or suggest a rotating-nozzle sprinkler. He seeks to remedy this deficiency by saying it would be obvious to modify Hruby’s sprinkler to give it a rotating nozzle as taught in Cochran. It is respectfully submitted, however, that Hruby expressly teaches away from this. In reference to the embodiment of Figs. 8-10, at col. 7, lines 3-11, the patent suggests use of the water dispensing device (i.e., nozzle) 34 of the embodiment of Figs. 1-6. However, the quoted passage states that guide ribs 135 are provided to

prevent nozzle 34 from rotating relative to housing 91. Similar ribs 74 are provided in the embodiment of Figs. 1-6. The inventor addresses this rejection in his Declaration (see ¶¶31-33.)

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984), see, also, M.P.E.P. (8th Ed., Rev. 1, Feb. 2003) §2141.02. Since Hruby expressly teaches that the nozzle should be stationary relative to the housing, it would not be obvious to modify the structure to make the nozzle rotatable, and claim 34 should be allowed.

New claims 62 and 63 are dependent on claim 8, claims 64 and 65 are dependent on claim 34, and claim 66 is dependent on claim 35. These claims are patentable for the reasons stated above in reference to their respective parent claims, and also because the specific features recited, in combination with those of their parent claims, are not taught or suggested in Walrath or Tyler, alone or in combination.

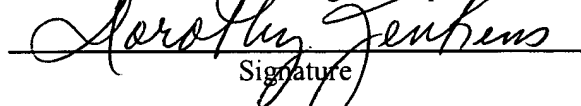
In view of the foregoing, favorable reconsideration and allowance of this application are respectfully solicited.

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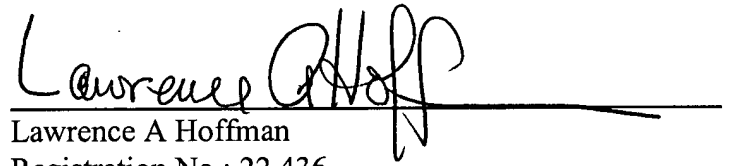

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